

Claims

We Claim:

1. A wavelength-selective optical switch comprising:
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a first waveguide and a second waveguide;
at least one of said first and second waveguides comprising
an electro-optic material having a set of Bragg gratings
disposed therein for interfacing between said first and
10 second waveguides; and
means for generating an electrical field across said electro-
optical material for changing an electro-optical characteristic
of said electro-optic material for effecting an optical
switching function corresponding to said electrical field.
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2. The wavelength-selective optical switch of claim 1 wherein:
said means for generating an electrical field is provided for
turning on and off a transmission of an optical signal from
20 said first waveguide to said second waveguide.
3. The wavelength-selective optical switch of claim 1 wherein:
said means for generating an electrical field is provided for
25 turning on and off a transmission of an optical signal of a
selective wavelength from said first waveguide to said
second waveguide.
4. The wavelength-selective optical switch of claim 1 wherein:
30 said means for generating an electrical field is provided for
turning on and off a transmission of an optical signal of a
tunable wavelength by changing said electrical field from
said first waveguide to said second waveguide.
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5. The wavelength-selective optical switch of claim 1 wherein:
said first waveguide intersecting said second waveguide and
set of Bragg gratings disposed near an intersection between
said first and second waveguides.
6. The wavelength-selective optical switch of claim 1 wherein:
said electro-optical material comprising a lanthanum-doped
lead zirconate titanate (PLZT).
7. The wavelength-selective optical switch of claim 1 wherein:
said electro-optical material comprising a LiNbO_3 .
8. The wavelength-selective optical switch of claim 1 wherein:
said electro-optical material comprising a solid material
having a tunable electro-optical characteristic.
9. The wavelength-selective optical switch of claim 1 wherein:
said electro-optical material comprising a non-poled
material having a tunable electro-optical characteristic.
10. The wavelength-selective optical switch of claim 1 wherein:
said electro-optical material comprising a ceramic material
having a tunable electro-optical characteristic.
11. The wavelength-selective optical switch of claim 1 wherein:
said electro-optical material comprising a polycrystalline
material having a tunable electro-optical characteristic.

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12. The wavelength-selective optical switch of claim 1 wherein:
said electro-optical material comprising a non-ferroelectric material having a tunable electro-optical characteristic.
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13. The wavelength-selective optical switch of claim 1 wherein:
said electro-optical material comprising a liquid crystal material having a tunable electro-optical characteristic.
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14. The wavelength-selective optical switch of claim 1 wherein:
said electro-optical material comprising a relaxor material having a tunable electro-optical characteristic.
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15. The wavelength-selective optical switch of claim 1 wherein:
said means for generating an electrical field across said electro-optical material for changing an refraction index of said electro-optic material for effecting an optical switching function corresponding to said electrical field.
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16. A wavelength-selective optical device comprising:
a set of Bragg gratings formed with an electro-optic material for electrically tuning and selecting a wavelength to transmit through said set of Bragg gratings.
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17. The wavelength-selective optical device of claim 16 further comprising:
a means for applying an electric field over said set of electro-optic material for tuning and selecting a wavelength.
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18. The wavelength-selective optical device of claim 16 wherein:
said electro optic material disposed in a waveguide.
- 5 19. The wavelength-selective optical device of claim 16 wherein:
said electro optic material disposed in a waveguide coupled
to and controlling a signal transmission from an input
waveguide to an output waveguide.
- 10 20. A method for configuring a wavelength-selective optical
device comprising:
electrically tuning and selecting a wavelength to transmit
15 through a set of Bragg gratings formed with an electro-optic
material.
- 20 21. The method of claim 20 further comprising a step of:
applying an electric field over said set of Bragg gratings for
tuning and selecting a wavelength.
- 25 22. The method of claim 21 further comprising a step of:
forming said set of Bragg gratings in a waveguide
comprising said electro optic material.
- 30 23. The method of claim 20 further comprising a step of:
forming said set of Bragg gratings in a waveguide
comprising said electro optic material and coupling said
waveguide to an input waveguide to an output waveguide
for controlling a signal transmission.
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24. A wavelength-selective optical switch comprising:
- 5 a first waveguide and a second waveguide;
at least one of said first and second waveguides comprising
an electro-optic material having a set of Bragg gratings
disposed therein for interfacing and wavelength-selecting an
optical signal transmission between said first and second
waveguides.
- 10 25. The wavelength-selective optical switch of claim 24 wherein:
- one of said first and second waveguides comprising an
silicon oxide waveguide.
- 15 26. The wavelength-selective optical switch of claim 24 further
comprising:
- 20 means for generating a variable electrical field across said
electro-optical material for changing and tuning an electro-
optical characteristic of said Bragg gratings for effecting an
optical switching and wavelength tuning function
corresponding to said variable electrical field.
- 25 27. The wavelength-selective optical switch of claim 24 wherein:
- said electro-optical material comprising a lanthanum-doped
lead zirconate titanate (PLZT).
- 30 28. The wavelength-selective optical switch of claim 24 further
comprising:
- said first intersecting said second waveguide with said set of
Bragg gratings disposed near an intersection between said
first and second waveguide.

29. The wavelength-selective optical switch of claim 24 further comprising:

a substrate for supporting one of said first and second waveguides; and

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means for generating an electrical field in parallel to a planar direction of said substrate across said electro-optical material for changing an electro-optical characteristic of said Bragg gratings for effecting a change of an optical signal transmission corresponding to said electrical field.

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30. The wavelength-selective optical switch of claim 24 further comprising:

a substrate for supporting one of said first and second waveguides; and

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means for generating an electrical field along a non-parallel direction relative to a planar direction of said substrate wherein said electrical field is applied across said electro-optical material for changing an electro-optical characteristic of said Bragg gratings for effecting a change of an optical signal transmission corresponding to said electrical field.

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31. The wavelength-selective optical switch of claim 24 further comprising:

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a substrate for supporting one of said first and second waveguides; and

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means for generating an electrical field along a perpendicular direction relative to a planar direction of said substrate wherein said electrical field is applied across said electro-optical material for changing an electro-optical characteristic of said Bragg gratings for effecting a change of an optical signal transmission corresponding to said electrical field.

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32. The wavelength-selective optical switch of claim 24 further comprising:

a substrate for supporting one of said first and second waveguides; and

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said first intersecting said second waveguide with said set of Bragg gratings disposed near an intersection between said first and second waveguide wherein said first waveguide disposed vertically above said second waveguide along a direction perpendicular to a planar direction of said substrate.

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